UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/584,400	05/14/2007	Diego Tirelli	05999.0291	9883

22852 7590 04/21/2009

FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER LLP
901 NEW YORK AVENUE, NW
WASHINGTON, DC 20001-4413

EXAMINER	
BOYLE, ROBERT C	

ART UNIT	PAPER NUMBER
1796	

MAIL DATE	DELIVERY MODE
04/21/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/584,400	TIRELLI ET AL.	
	Examiner	Art Unit	
	ROBERT C. BOYLE	1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 March 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *42-57 and 59-83* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *42-57 and 59-83* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *23 June 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. Any rejections stated in the previous Office Action and not repeated below are withdrawn.

3. The new grounds of rejection set forth below are necessitated by applicant's amendment filed on March 9, 2009. In particular, claim 1 has been amended to include the limitation of "feeding water to said mixing device" and to include limitations from previously presented claim 58. This presents the claims in a manner not previously examined. Thus, the following action is properly made FINAL.

4. Applicant notes, on page 11 of the Remarks filed on March 9, 2009, that the current application has a U.S. effective filing date of December 24, 2003 and since Scholz qualifies under 102(a), it cannot be prior art under 102(e). MPEP 2136 states: "Revised 35 U.S.C. 102(e) allows the use of certain international application publications and U.S. patent application publications, and certain U.S. patents as prior art under 35 U.S.C. 102(e) as of their respective U.S. filing dates, including certain international filing dates." The Scholz reference was filed in the U.S. on December 19, 2002, almost a year before the current application was filed. Therefore, Applicant's statement that the rejection using Scholz was improper and cannot be a basis for declaring the next Office Action is incorrect.

5. Applicant notes, on page 18 of the Remarks filed on March 9, 2009, that the Office Action of November 7, 2008, that the rejection of claims 58 and 61 is over Adam alone and that Applicant believes the rejection was intended to be over Scholz and Adams. Applicant is correct.

Claim Rejections - 35 USC § 103

6. Claim 42, 45-49, 51-51, 53-56, 62-65, 69-70, and 81-83 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stevens et al., U.S. Patent 5,543,472 in view of Adam et al., *Methyltrioxorhenium(VII)-Catalyzed Epoxidation of Alkenes with the Urea/Hydrogen Peroxide Adduct*, Angew. Chem. Int. Ed. Engl. 1996, 35, No. 5, 533-535.

7. As to claims 42 and 61, Stevens teaches epoxidation of diene containing polymers, such as polyisoprene, by adding the polymer and a percarboxylic acid epoxidizing agent and hydrogen peroxide in an aqueous solution, followed by further addition of water, to a flask, mixing, and removing the polymer from the flask (abstract; column 1, lines 47-57; column 2, lines 5-46, 51-67; column 3, lines 21-55; column 4, lines 45-67; column 5, lines 1-53; column 7, line 7-column 8, line 53).

8. Stevens does not teach the hydrogen peroxide precursor is selected from inorganic persalts, metal peroxides and hydrogen peroxide adducts. Adam teaches the use of the urea/hydrogen peroxide adduct to epoxidize organic olefins (pages 533-534). It would have been obvious to one of ordinary skill in the art to use the urea adduct

taught by Adam because the urea adduct suppresses secondary reactions such as cleavage and rearrangement reactions (Adam: page 533).

9. As to claim 45, Stevens teaches addition of the polymer as a solid (column 7, lines 50-67).

10. As to claim 46, Adam teaches the urea adduct is added to the mixing device as a solid (page 534).

11. As to claims 47-48, Stevens teaches epoxidation at 25-65ºC (column 5, lines 1-27). The range taught by Stevens overlaps the claimed ranges. It is well settled that where prior art describes the components of a claimed compound or compositions in concentrations within or overlapping the claimed concentrations a prima facie case of obviousness is established. See MPEP 2144.05; *In re Harris*, 409, F3.d 1339, 1343, 74 USPQ2d 1951, 1953 (Fed. Cir 2005); *In re Peterson*, 315 F.3d 1325, 1329, 65 USPQ 3d 1379, 1382 (Fed. Cir 1997); *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936-37 (CCPA 1990); *In re Malagari*, 499 F.2d 1297, 1303, 182 USPQ 549, 553 (CCPA 1974).

12. As to claim 49, Stevens teaches reaction time of ½ hour to 3 hours (column 5, lines 1-27). The range taught by Stevens overlaps the claimed ranges and overlapping ranges establish a prima facie case of obviousness. See MPEP 2144.05.

13. As to claim 51, Stevens teaches the final polymer has an epoxy content of 0.40 milliequivalents of epoxy per gram polymer (column 7, lines 40-45).

14. Even if Stevens does not teach the epoxy content as recited in claims 51-52, it is the examiner's position that the epoxy content is a result effective variable because

changing it will clearly affect the type of product obtained. See MPEP 2144.05(B). Case law holds that "discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art." See *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In view of this, it would have been obvious to one of ordinary skill in the art to utilize the epoxy content within the scope of the present claims so as to produce desired end results.

15. As to claim 53, claims 53 states a property of the diene polymer: a Tg below 20ºC. While Stevens does not elaborate on the property, Stevens teaches essentially the same diene polymer and process as that of the claimed, and one of ordinary skill in the art would have a reasonable basis to believe the diene polymer of Stevens exhibits essentially the same properties. Since the PTO cannot conduct experiments, the burden of proof is shifted to the applicants to establish an unobvious difference. See *In re Best*, 562 F.2d 1252, 195 USPQ 430 (CCPA 1977).

16. Even if properties of the diene polymer of the instant claims and the prior art examples are not the same, it would still have been obvious to one of ordinary skill in the art to use a diene polymer having the claimed properties because it appears that the references generically embrace the claimed diene polymer and one of ordinary skill in the art would have expected all embodiments of the reference to work. Applicants have not demonstrated that the differences, if any, between the claimed diene polymer and the prior art give rise to unexpected results.

17. As to claim 54, Stevens teaches using polyisoprene (column 3, lines 21-32).

18. As to claim 55, Stevens teaches copolymerization with styrene (column 3, lines 21-32).

19. As to claim 56, Stevens teaches using butadiene polymers (column 3, lines 21-32).

20. As to claims 62-63 and 69-70, Stevens teaches using 29g of epoxidizing agent, which corresponds to about 6 phr (column 7, lines 7-16).

21. As to claims 64-65, Stevens teaches using peracetic acid (column 7, lines 7-16).

22. As to claims 81-82, Stevens teaches adding 20 wt% water (column 7, lines 7-16).

23. As to claim 83, Stevens teaches adding water in more than one step (abstract; column 2, lines 5-46).

24. Claims 43-44, 49-52, 57, and 71-80 rejected under 35 U.S.C. 103(a) as being unpatentable over Stevens and Adam in view of Ohtsuka et al., U.S. Patent 5,840,809. The discussion with respect to Stevens and Adam as set forth in paragraphs 5-22 above is incorporated here by reference.

25. As to claims 43-44, Stevens teaches epoxidation of diene containing polymers by adding the polymer and a percarboxylic acid epoxidizing agent and hydrogen peroxide in an aqueous solution, followed by further addition of water, to a flask, mixing, and removing the polymer from the flask (abstract; column 1, lines 47-57; column 2, lines 5-46, 51-67; column 3, lines 21-55; column 4, lines 45-67; column 5, lines 1-53; column 7, line 7-column 8, line 53).

26. Stevens does not teach reaction in an extruder. However, Ohtsuka teaches using a co-rotating twin screw extruder in an epoxidation of a polymer (abstract; column 6, lines 15-30; column 7, lines 32-45). One of ordinary skill in the art at the time the invention was made would have been motivated to modify the process in Stevens with the mixer taught in Ohtsuka because using the extruder allows for easier processing because the solvent removing capacity is large and the amount of scorched resin is small, see column 7, lines 28-31 of Ohtsuka et al. Therefore, the invention as a whole would have been prima facie obvious to one of ordinary skill in the art at the time the invention was made.

27. As to claims 49-50, Ohtsuka teaches reaction time of 0.2-10 hours (column 6, lines 15-30). The range taught by Ohtsuka overlaps the claimed ranges and overlapping ranges establish a prima facie case of obviousness. See MPEP 2144.05.

28. As to claims 51-52, Ohtsuka teaches polymers with the epoxy equivalent ranging from 140-2700 (column 37, lines 27-31). The range taught by Ohtsuka overlaps the claimed ranges and overlapping ranges establish a prima facie case of obviousness. See MPEP 2144.05.

29. As to claim 57, Ohtsuka teaches polymers with molecular weights from 10,000-100,000 (column 4, lines 22-34).

30. As to claims 71-72, Ohtsuka teaches using nonionic surfactants that include fatty acid esters that include glycerol disterarate (column 12, lines 45-67).

31. As to claim 73, Ohtsuka teaches using stearamide (column 13, lines 3-5).

32. As to claim 74, Ohtsuka teaches that the non-ionic surfactant includes polyoxyethylene glycol ethers (column 13, lines 3-24).

33. As to claims 75-76, Ohtsuka teaches adding 0.05 to 1 phr of surfactant (column 12, lines 27-40).

34. As to claims 77-80, Ohtsuka teaches adding 0.005 to 10 phr of phenoloic stabilizer (column 2, lines 35-40).

35. Claim 59 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stevens and Adam in view of Corey et al., *Buffered Potassium Peroxymonosulfate-Acetone Epoxidation of α,β-Unsaturated Acids*, J. Org. Chem. 1986, 51, 1925-1926. The discussion with respect to Stevens and Adam as set forth in paragraphs 5-33 above is incorporated here by reference.

36. As to claim 59, Stevens teaches epoxidation of diene containing polymers by adding the polymer and a percarboxylic acid epoxidizing agent and hydrogen peroxide in an aqueous solution, followed by further addition of water, to a flask, mixing, and removing the polymer from the flask (abstract; column 1, lines 47-57; column 2, lines 5-46, 51-67; column 3, lines 21-55; column 4, lines 45-67; column 5, lines 1-53; column 7, line 7-column 8, line 53).

37. Stevens does not teach using an inorganic persalt to perform epoxidizations. Corey teaches using potassium peroxymonosulfate in epoxidations. One of ordinary skill in the art at the time the invention was made would have been motivated to modify the epoxidation process in Stevens with the peroxide precursor taught in Corey because

potassium peroxymonosulfate allows the epoxidation reaction to be run at low temperatures with no need to control pH, see Corey, page 1926. Therefore, the invention as a whole would have been prima facie obvious to one of ordinary skill in the art at the time the invention was made.

38. Claim 60 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stevens and Adam in view of Wurziger et al., WIPO Publication WO 01/83466. For translation reasons, the national stage entry, U.S. Patent Application Publication 2003/0055293, will be cited to. The discussion with respect to Stevens and Adam as set forth in paragraphs 5-36 above is incorporated here by reference.

39. As to claim 60, Stevens teaches epoxidation of diene containing polymers by adding the polymer and a percarboxylic acid epoxidizing agent and hydrogen peroxide in an aqueous solution, followed by further addition of water, to a flask, mixing, and removing the polymer from the flask (abstract; column 1, lines 47-57; column 2, lines 5-46, 51-67; column 3, lines 21-55; column 4, lines 45-67; column 5, lines 1-53; column 7, line 7-column 8, line 53). Stevens does not teach using a metal peroxide to epoxidize the olefin.

40. Wurzinger teaches using zinc peroxide in epoxidation reactions (abstract; paragraph 0033). It would have been obvious to one of ordinary skill in the art to use the metal peroxide taught in Wurzinger with the epoxidation process taught in Stevens because a metal salt would be easy to separate from the reaction mixture in a phase separation and Wurzinger gives an epoxidation process that increases safety to the

operators and the environment, see paragraph 0043. Therefore, the invention as a whole would have been prima facie obvious to one of ordinary skill in the art at the time the invention was made.

41. Claims 66-68 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stevens and Adam in view of Zhang et al., *Preparation of Epoxidized Rubber Using a Reactive Processing Technique. I. Synthesis and Characterization of Epoxidized Polybutadiene Rubber*, Journal of Applied Polymer Science, Vol 81, 2987-2992 (2001). The discussion with respect to Stevens and Adam as set forth in paragraphs 5-38 above is incorporated here by reference.

42. As to claim 66, Stevens teaches epoxidation of diene containing polymers by adding the polymer and a percarboxylic acid epoxidizing agent and hydrogen peroxide in an aqueous solution, followed by further addition of water, to a flask, mixing, and removing the polymer from the flask (abstract; column 1, lines 47-57; column 2, lines 5-46, 51-67; column 3, lines 21-55; column 4, lines 45-67; column 5, lines 1-53; column 7, line 7-column 8, line 53). Stevens does not teach using a dicarboxylic acid.

43. Zhang teaches using phthalic acid (scheme 1, page 2988). It would have been obvious to use the phthalic acid taught by Zhang with the epoxidation taught by Stevens because the peroxide of phthalic acid has easy preparation, stability and is a solid at room temperature and give low levels of epoxidation with few side reactions (pages 2988, 2992).

44. As to claims 67-68, Zhang teaches using phthalic anhydride (p 2988, first paragraph).

Response to Arguments

45. Applicant's arguments with respect to the 102(e) rejection over Scholz have been considered but are moot in view of the new ground(s) of rejection.

46. Applicant's arguments with respect to the 103 rejections over Scholz have been considered but are moot in view of the new ground(s) of rejection.

47. Applicant's arguments regarding secondary references Ohtsuka, Zhang, Wurziger, Corey and Adam with respect to the 103 rejections over Scholz have been considered but are moot in view of the new ground(s) of rejection.

48. Applicant argues that none of the references suggest the hydrogen peroxide precursors are interchangeable, and therefore the references are not applicable. This is not persuasive. Stevens teaches that peracids can be made by oxidizing acids (column 5, lines 28-38) and that peracids can be formed in situ (column 1, lines 47-57). It would have been obvious to one of ordinary skill in the art that hydrogen peroxide is used for epoxidation of olefins, it is a dangerous and unstable molecule and that a variety of precursors could be used to form the peroxide in situ for safety and convenience. For example, it would have been obvious to use the urea adduct because the urea adduct suppresses secondary reactions such as cleavage and rearrangement reactions (Adam: page 533). Therefore, Applicant's arguments are not persuasive.

49. Applicant argues that references Corey, Wurziger, and Adam do not teach epoxidation of polyalkenylenes. This is not persuasive.

50. While Corey, Wurziger, and Adam do not disclose all the features of the present claimed invention, Corey, Wurziger, and Adam are used as a teaching reference, and therefore, it is not necessary for this secondary reference to contain all the features of the presently claimed invention, MPEP 2145; *In re Nievelt*, 482 F.2d 965, 179 USPQ 224, 226 (CCPA 1973); *In re Keller* 624 F.2d 413, 208 USPQ 871, 881 (CCPA 1981). Rather these references teach a certain concept, hydrogen peroxide precursors able to be used with epoxidation reactions, and in combination with the primary reference, discloses the presently claimed invention.

Conclusion

51. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ROBERT C. BOYLE whose telephone number is (571)270-7347. The examiner can normally be reached on Monday-Friday, 9:00AM-5:00PM Eastern.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vasu Jagannathan can be reached on (571)272-1119. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/R. C. B./
Examiner, Art Unit 1796
/Vasu Jagannathan/
Supervisory Patent Examiner, Art Unit 1796